

Paper 212-2007

SAS® Information Map Studio and SAS® Web Report Studio – A Tutorial

Angela Hall, Zencos Consulting LLC, Durham, NC

Brian Miles, Zencos Consulting LLC, Durham, NC

ABSTRACT

Find out how to provide the vital link between critical data and Business reporting. Learn to develop, deploy and administer analytic reports from Web Report Studio. From creating information maps off of cubes, tables, and relational tables to applying row level security on reports, this tutorial will demonstrate how to deploy customized BI reports in an efficient and effective manner.

INTRODUCTION

The purpose of this paper is to provide examples of functionality from within SAS® Information Map Studio and SAS® Web Report Studio in a manner that is easy to follow and replicate. The examples are based off of the SASHELP.SHOES data set that is distributed with SAS® 9.

SAS® Information Map Studio enables its users to apply the business logic and business terms to data whose fields, calculations, and naming conventions tend to be more IT centric. This tool can serve as the single place that business rules are applied and made available to business users throughout the enterprise.

SAS® Web Report Studio is a web based ad hoc reporting application that utilizes the business logic contained within Information Maps that are created in SAS® Information Map Studio. Reports developed in SAS® Web Report Studio are easily customizable and can utilize report level or data level (row based) security.

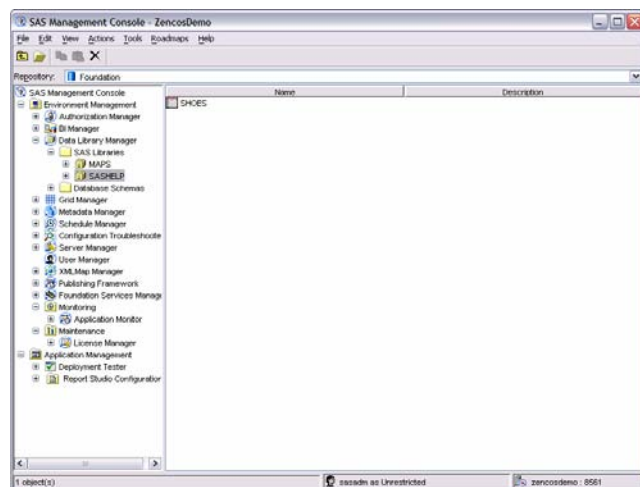
PREREQUISITES FOR EXAMPLES

Before Information Maps can be built, metadata for the location of the data and the layout of the data must exist in SAS® Metadata. This can be done from within the SAS® Management Console.

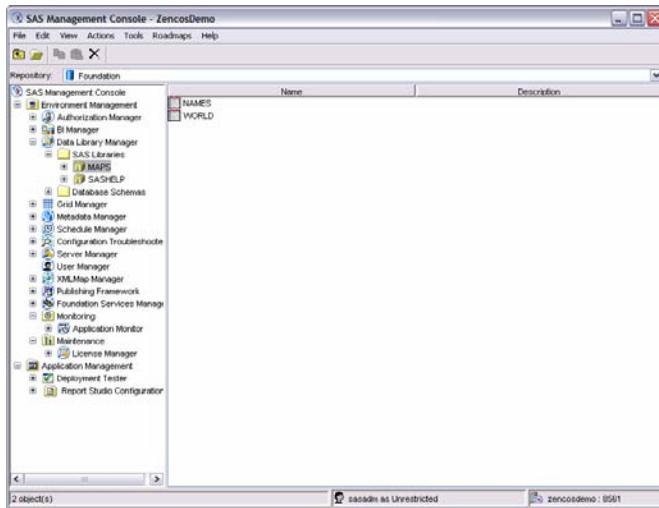
Step 1: Assign SASHELP Libname to the location of the SASHELP.SHOES table. Import metadata for the SASHELP.Shoes table into SAS® Metadata from the SAS® Management Console.

Here is how the libname is assigned on our server:

```
LIBNAME SASHELP BASE "C:\Program Files\SAS\SAS 9.1\core\sasHELP" ;
```



Step2: Assign Maps libname to the location of SAS® Map tables on the server. Import metadata for the NAMES and WORLD tables. The Maps libname needs to be preassigned to the SAS® spawners as well. This can be accomplished in the Management Console.



Step3: Create a Stored Process that has an output of NONE and is executed by the Object Spawner (Information Maps can only execute Stored Processes associated to the Object Spawner). We named the stored process "Set Geo Formats". The following syntax is used for the stored process:

```
%STPBEGIN;

options fmtsearch=(sashelp.mapfmts) ;

/* Ensure there is only 1 record per cont */

data names trash;
set maps.names;
by cont;
if first.cont then output names;
else output trash;
run;

data maps.names;
set names;
run;

/* Clean up regions to be cont specific */
proc sql;

    Update sashelp.shoes set region = 'North America'
        WHERE region = 'Canada';

    Update sashelp.shoes set region = 'North America'
        WHERE region = 'Central America/Caribbean';

    Update sashelp.shoes set region = 'North America'
        WHERE region = 'Central America';

    Update sashelp.shoes set region = 'Europe'
```

```

WHERE region = 'Eastern Europe';
Update sashelp.shoes set region = 'Asia'
WHERE region = 'Middle East';

Update sashelp.shoes set region = 'Asia'
WHERE region = 'Pacific';

Update sashelp.shoes set region = 'North America'
WHERE region = 'United States';

Update sashelp.shoes set region = 'Europe'
WHERE region = 'Western Europe';

quit;

%STPEND;

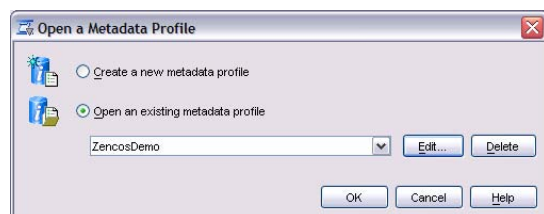
```

SAS® INFORMATION MAP STUDIO

One of the first steps to using SAS® Business Intelligence tools for reporting is to create logical mappings from the reporting data to the SAS® Metadata Structure. Tools like SAS® Web Report Studio will use these logical mappings to display the business labels to reporting end-users while still using the physical attributes of the data behind the scenes to access the data. The mappings from physical attributes to business attributes/rules are called Information Maps and they can be created, edited, secured, and deleted from within SAS® Information Map Studio.

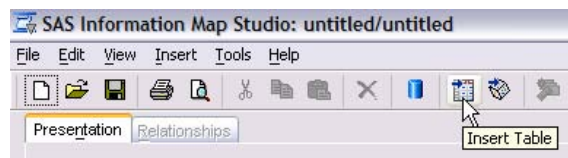
OPENING UP SAS® INFORMATION MAP STUDIO

Upon opening up SAS® Information Map Studio, users are prompted to connect to the SAS® Metadata Server using an existing profile or by creating one. The examples in this tutorial connect to a metadata server named ZencosDemo as the user sasadm.

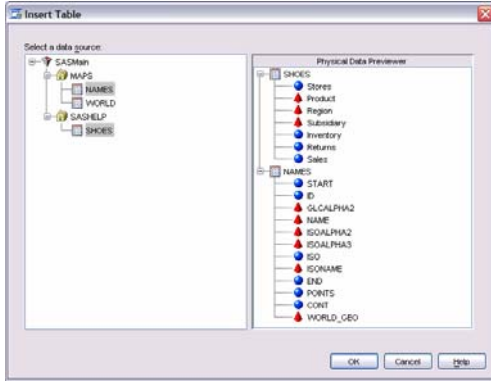


SELECTING DATA FOR AN INFORMATION MAP

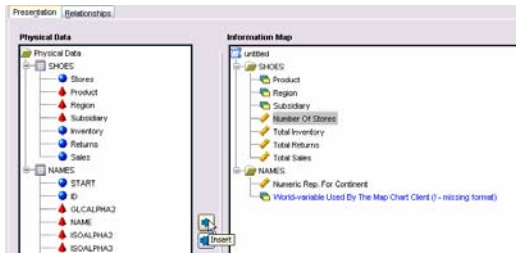
The input data for an information map can be a SAS® OLAP cube or any data that can be accessed by assigning a SAS® libname (DBMS, CSV, etc.). In this tutorial we will only be using table data, but adding a cube uses a similar approach.



Select the data table(s) that contains the data for the information map. We select the SASHELP.SHOES and MAPS.NAMES tables.

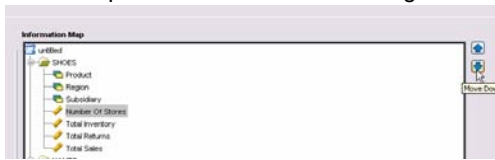


Use the arrows to add or remove Information Map data attributes.



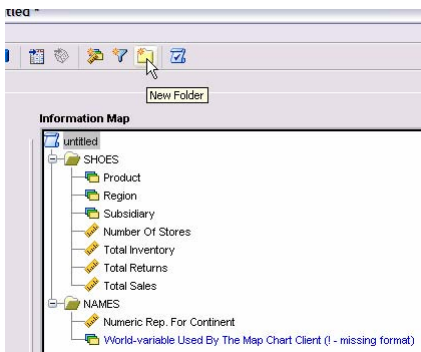
ORGANIZING DATA ATTRIBUTES

Use the up and down arrows on the right hand side to reorder attributes in an Information Map.

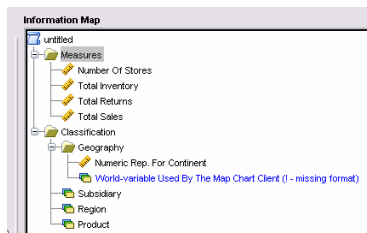


Data can be categorized by folders laid out in a custom directory structure. Folders are very useful when Information Maps contain many attributes.

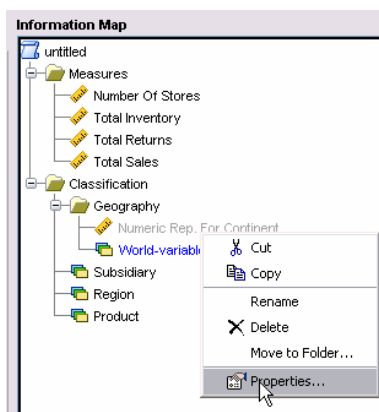
Before custom directory structure.



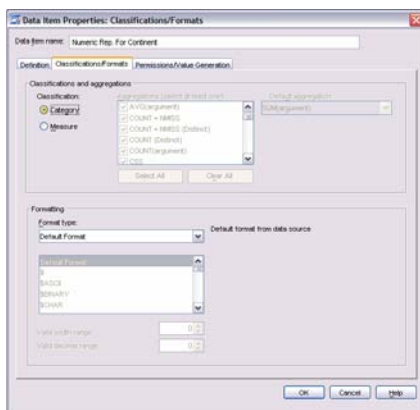
After custom directory structure.



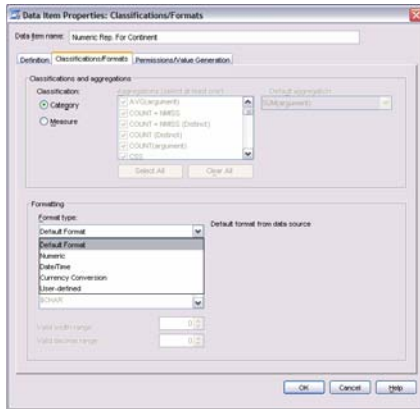
All attributes within SAS® Information Map Studio are defined as measures or categories. A measure is any data attribute that can be aggregated or quantified (like revenue, # of widgets, customerID, etc). Category attributes are used to classify aggregations (like year, region, etc.). By default, numeric fields are as classified metrics and non numeric fields are classified as category variables. In some cases, numeric attributes don't make sense aggregated. To change the properties of an attribute, right mouse click on the attribute and select properties.



Click on the Classifications / Formats tab. Select whether or not the data attribute is a measure or classification.

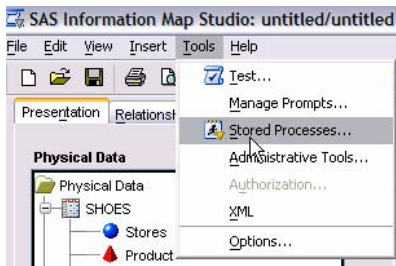


SAS® formats can be selected for data attributes from within the same window. In many cases, custom formats are required to turn codes and keys into meaningful category variables. For user defined formats to be accessible to SAS® Information Map Studio, either a LIBRARY libname must be set to the location of the formats or the FMTSEARCH option must be used in the SASv9.cfg file. Details on custom formats are located at the following link: http://support.sas.com/documentation/onlinedoc/91pdf/sasdoc_913/infomap_tips_9310.pdf

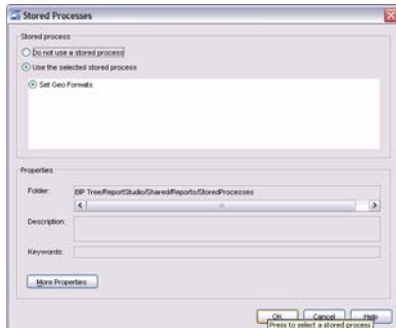


STORED PROCESSES

SAS® Stored Processes can be executed prior to resolving data in an information map. This is critical for situations where an Information Map needs to be used, but data needs to be updated first, SAS® code needs to be run to access data, or set SAS® macro variables need to be set.



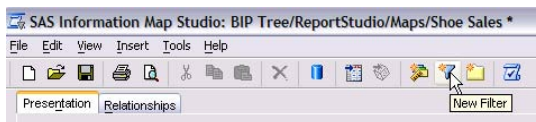
Select a stored process. Only Stored Processes that use the SAS® Object Spawner as the execution server are available from the selection screen.



FILTERS

Filters are predefined subsetting logic that can be applied to Information Maps. Filters can be based off of category attribute values (like Region='Africa') or by comparing the aggregated amount for a measure (like Revenue >= 100).

Click the filter icon to create a new filter.



Enter a name. Select the information map attribute to filter by (In this case Region is selected). Then select how the filter will be applied:

- 1) Enter a value in this window.
- 2) User is prompted for a value to use in the filter.
- 3) Input an expression in this window.
- 4) Derive identity values. These are properties of a user that can be used in a query, like a username, user logic, identity group, etc. for row level security.

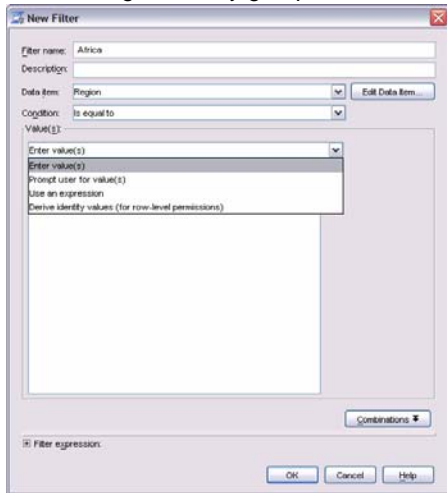
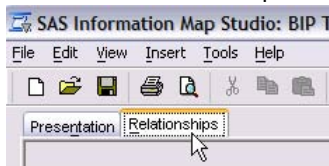


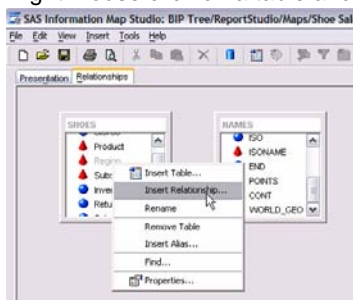
TABLE JOINS / RELATIONSHIPS

In order for multiple data sources to be seamlessly queried from one information map, data source join criteria needs to be stored in information maps.

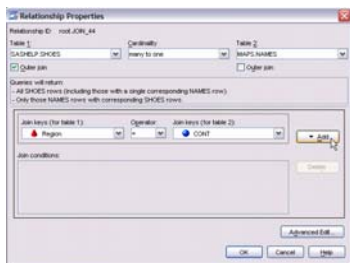
Click on the 'Relationships' tab.



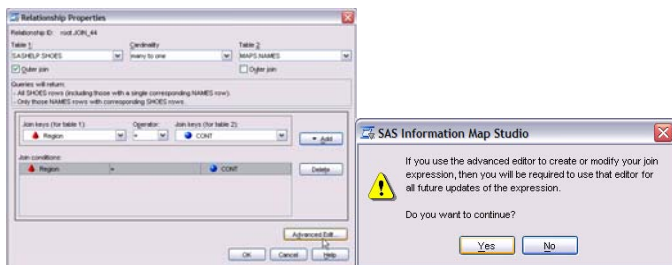
Right mouse click on a table and select 'Insert Relationship'.



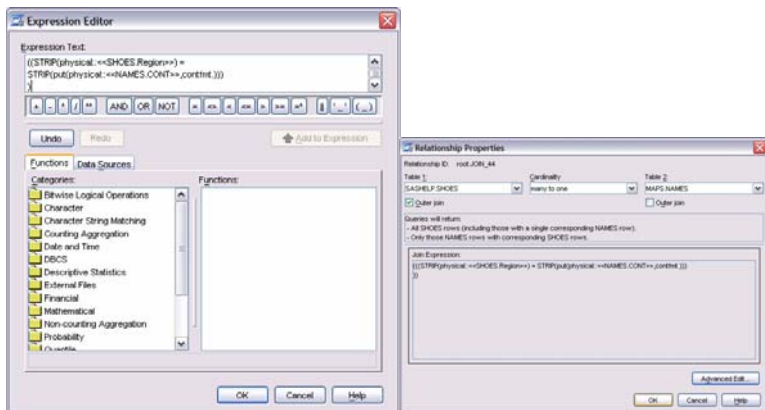
Select the tables to build the relationship between. Specify whether or not to perform an outer join and the type of cardinality between tables. Select the columns to join and click the add button.



Notice the fields I selected are different types (Region is char and Cont is numeric). We need to click Advanced Edit and change the join logic.



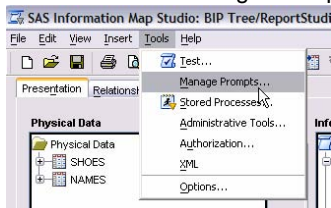
Change the logic to use a put statement on the Conf field to get the region text in the confmt format. Click 'OK'.



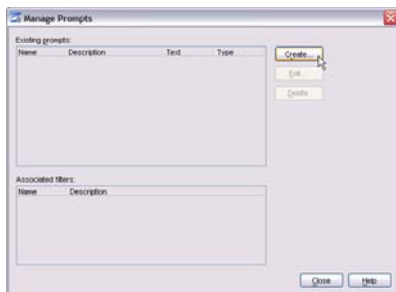
PROMPTS

Prompts allow SAS® Web Report Studio users to specify one or more values when a query is executed. The values that SAS® Web Report Studio users insert are used to apply a filter to the reporting data set and when the query completes, the report contains values from the customized subset of data.

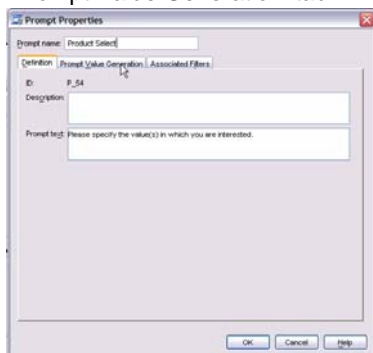
Select Tools → Manage Prompts...



Click the create button.



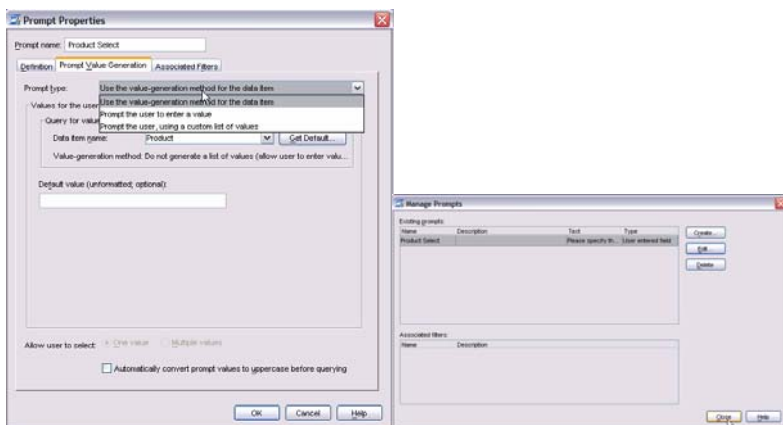
Put in a name, description, and the text that SAS® Web Report Studio users will be prompted with. Click on the 'Prompt Value Generation' tab.



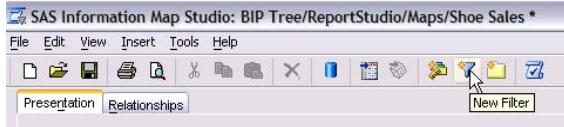
Select one of 3 prompt types:

- 1) Values dynamically generated from the source table.
- 2) User types in a value.
- 3) Create a custom list of values for the user to select from.

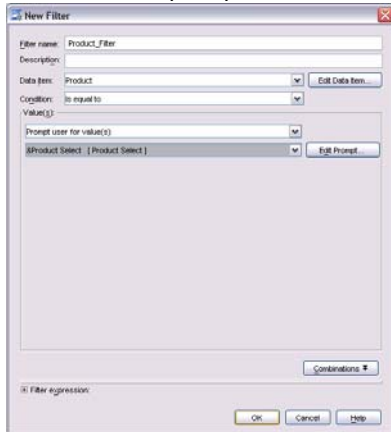
Select the data attribute that will be filtered and put a default value in, if there should be one. Click 'OK' when done.



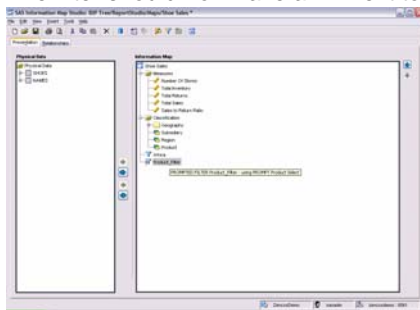
In order for a prompt to work, it must be associated to a filter. Click on the filter icon.



Create a new filter for the variable that you're prompting values for. Select the option 'Prompt user for value(s)' and then select the prompt that will be used to populate the filter.



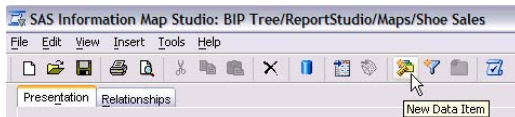
The filter should now have a "?" next to it.



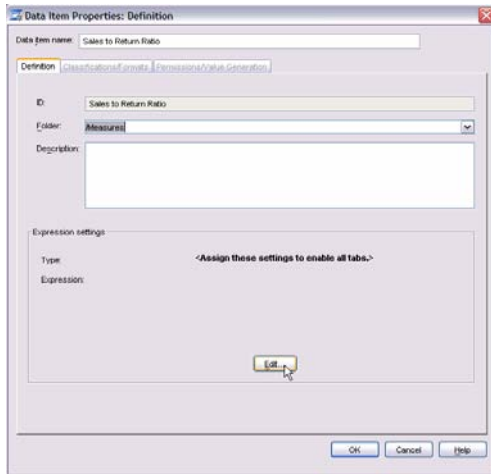
CUSTOM CALCULATIONS

Custom calculated fields can be created off of any data attributes (Category or Measure) that exist in the information map.

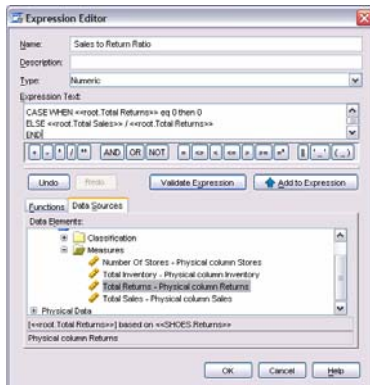
Select the 'New Data Item' icon.



Assign a name to the new data item. Select the folder that it needs to be added to within the information map directory structure, in this case we selected 'Measures'. Click the edit button to insert a formula.



Place any type of syntax that is valid for columns generated in proc SQL code. In this example we use a case statement to keep from dividing by 0. To validate the syntax for a new expression, click on the 'Validate Expression' window.

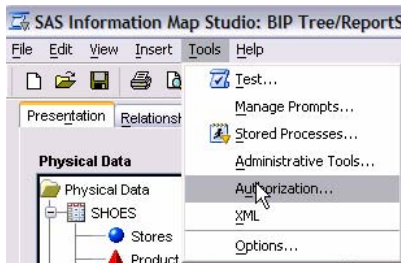


SECURITY

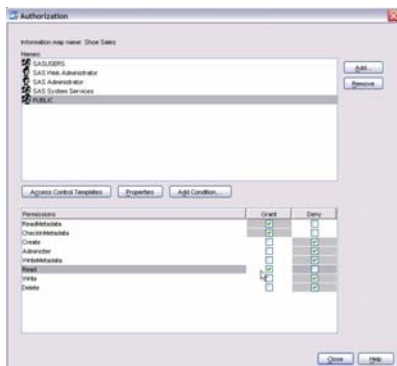
Security can be set on an Information Map as a whole or by assigning a pre-filter which applies row level security to users or groups.

A pre-filter or mandatory filter can be applied before any other filters are applied. Pre-filters can be either applied based off of users or groups or a general filter can be applied to the information map, regardless of the user or group. Information Maps must be saved before a pre-filter can be applied, otherwise the "Authorization" option will not be available.

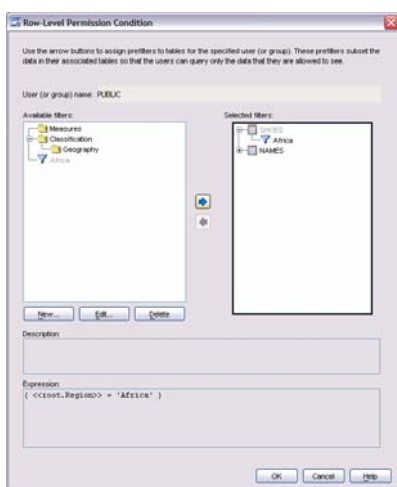
Select Tools → Authorization.



For users or groups that shouldn't be able to access the information map, deny read and read metadata access for those users. For the user or group that needs a pre-filter applied, click on the grey box around the read permission box until the 'Add Condition' button is available.



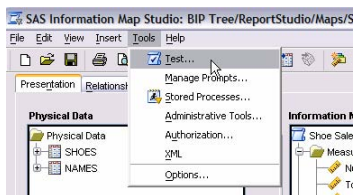
Click on the 'Add Condition' button. Select the filter that needs to be applied for security and click ok.



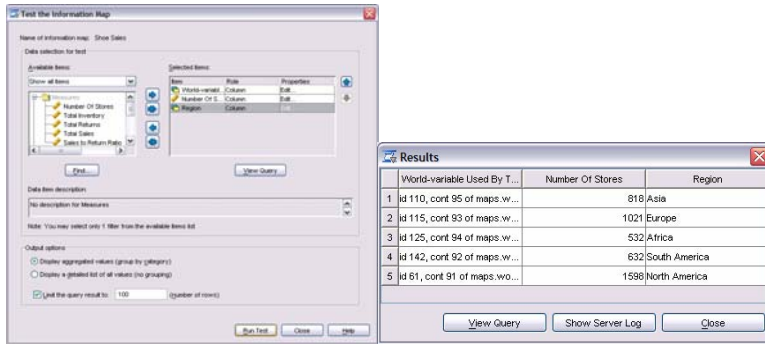
TESTING

It is always a good idea to test information maps out in SAS® Information Map Studio before using them from any of the reporting tools. If data from an information map cannot be surfaced from within SAS® Information Map Studio, then it won't be able to be surfaced from other reporting tools.

Select Tools → Test...

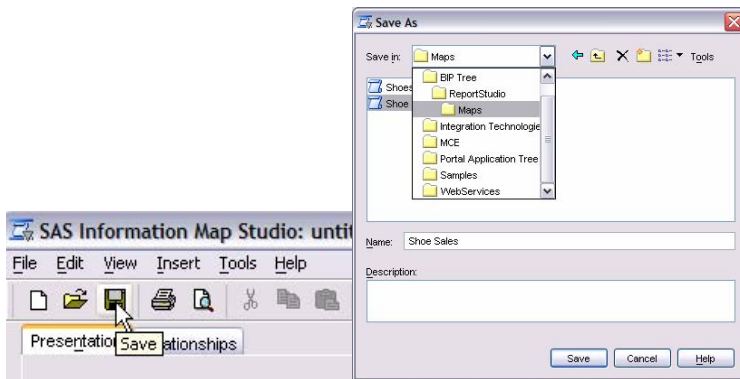


Move the fields for the test over to selected items. Click view. To see the Proc SQL or MDX syntax for the query, click on the 'View Query' button. To execute the query, select the 'Run Test' button.



SAVE INFORMATION MAP

Information maps need to be saved into SAS® Metadata at a particular location to be accessed by SAS® Web Report Studio. After making changes to information maps, click the save button and save the maps to the following location (BIP Tree/Report Studio/Maps).



SAS® WEB REPORT STUDIO

The examples in this section assume that you created the information map from the SAS® Information Map Studio section prior to this. Our environment consists of Apache Tomcat running on port 8080 of a server named zencosdemo. SAS® WebReportStudio is deployed to that instance tomcat.

LOGGING INTO SAS® WEB REPORT STUDIO

Go to the following url and SAS® Web Report Studio will prompt for a username and login:

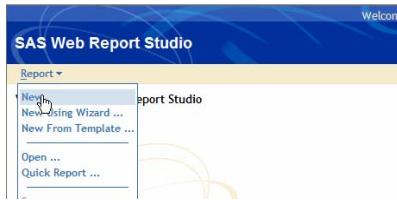
<http://zencosdemo:8080/SASWebReportStudio/>

Provide credentials for a user that exists in SAS® Metadata and has read and read metadata access to the information map created in the previous section.



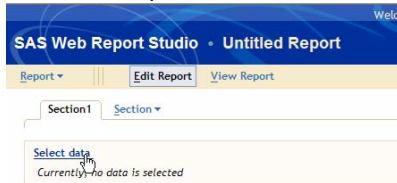
CREATING A NEW REPORT

Once logged into SAS® Web Report Studio, select Report → New from the upper left toolbar.

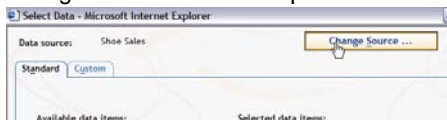


SELECTING DATA FOR A REPORT

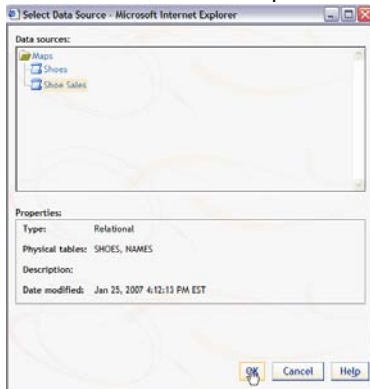
Next, if the report uses an information map, it needs to be selected by clicking on the “Select data” link.



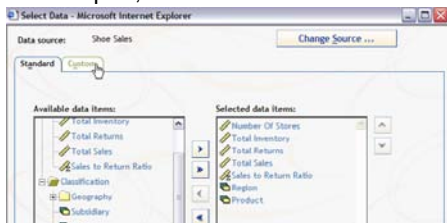
When the “Select Data” pop up window appears, click on the “Change Source...” link at the upper right corner to change the information map used in the report.



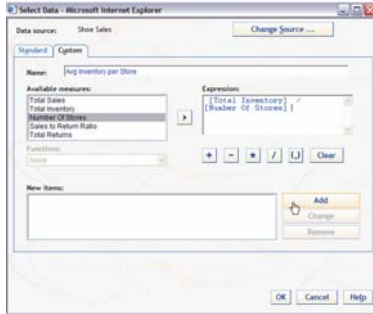
Select an information map and click the ‘OK’ button.



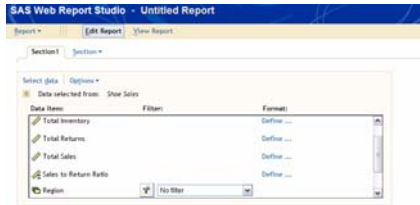
Use the arrows to move items over to the “Selected data items:” box. To create custom calculations that are available in the report, click on the ‘Custom’ tab.



Insert a name for the custom calculation and insert an expression. Click the ‘Add’ button to add the new custom calculation to the report. Then click ‘OK’.



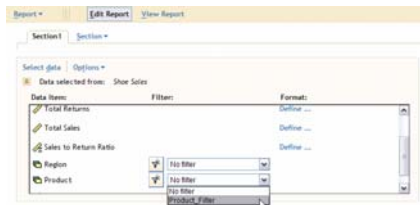
When the “Edit Report” screen refreshes, the data items selected in the “Select Data” window should be displayed in the list of data items.



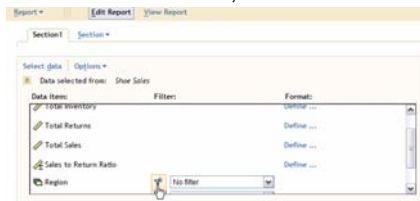
REPORT LEVEL FORMATS AND FILTERS

For any of the category data items, a filter/prompt from the information map can be selected or a new filter can be created in SAS® Web Report Studio.

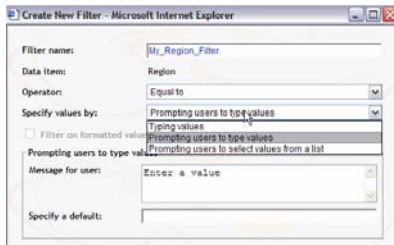
To select an existing filter created in the information map, just click the drop box next to a category data item in the “Data item:” select box.



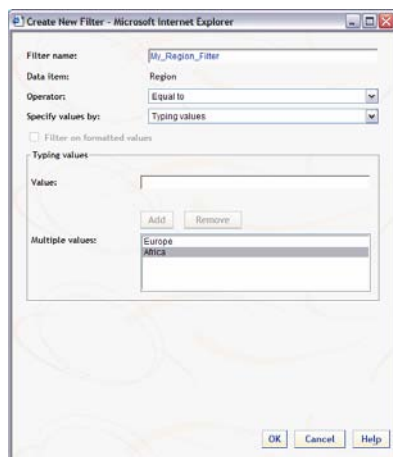
To create a new filter, click on the “new filter” button.



Give the filter a name, an operator, and select whether to put in a value or prompt user's for values.



The following filter would filter the data by Region='Europe' or Region='Africa'.

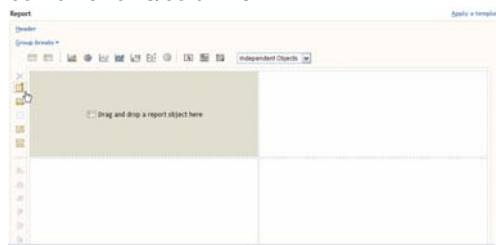


By default, the new filter is selected in the “Data item:” box. All data that is surfaced in the report (with the exception of stored processes) will filter the data by filters selected in the “Data item:” box.

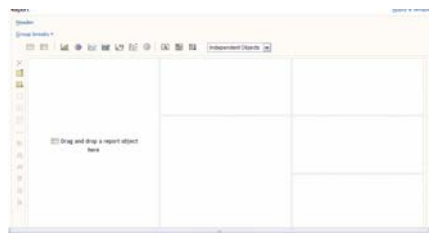


LAYOUT CUSTOMIZATION

The report section is the area where the report output can be customized. The layout for a report is generally a grid. User's can use the toolbars in the upper left corner of the grid to add new rows/columns, split rows/columns, or combine rows/columns.



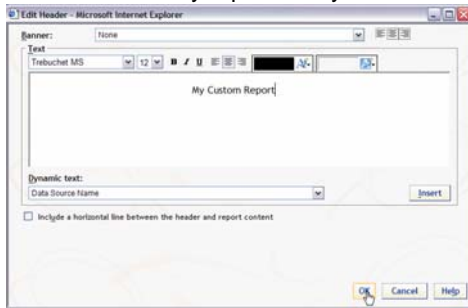
The layout that I am using consists of 3 rows and 3 columns. In the first column, all three rows are merged into 1 cell. In the second column, the last two rows are merged into 1 cell.



A header for the report can be created by clicking on the header link.



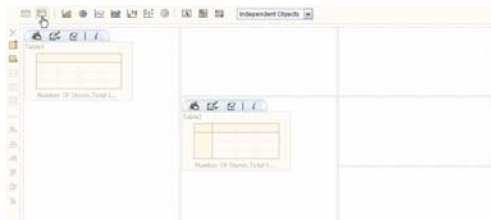
The header for my report is "My Custom Report".



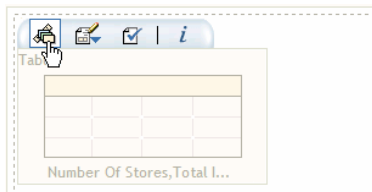
INSERTING REPORT TABLES , GRAPHS, AND TEXT

In the report section, users can drag and drop report objects onto a report. Tables, graphs, text, images, and stored processes can all be placed in reports from the report object toolbar.

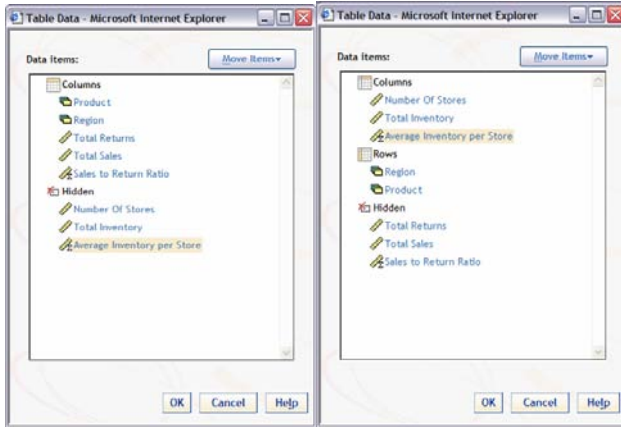
Two types of tables can be inserted into reports. A list table requires all column headers to be placed on the columns. The crosstab table object enables data items to be placed on the row and/or column axis and categories are cross tabulated.



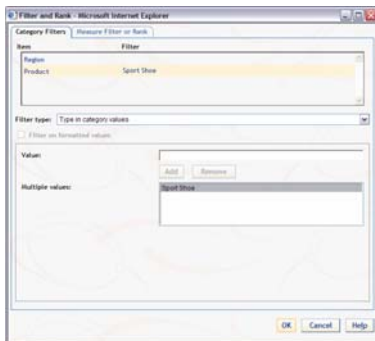
Once an object is placed into the report, each object has a toolbar above it. The toolbars allow users to order and place data items on the appropriate axis's, apply filters at the object level, sort, apply totals, etc.



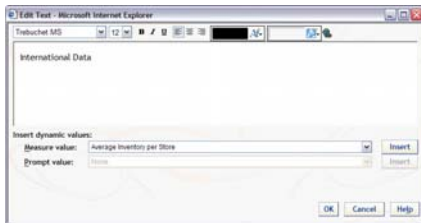
Below are examples of how to order data attributes for the list and crosstab tables.



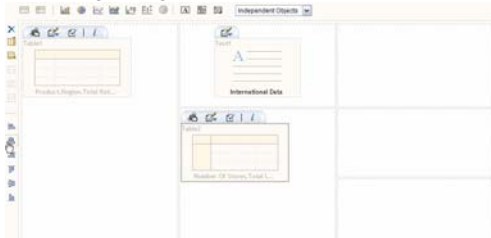
Below is an example of filtering that can be applied to either or both tables.



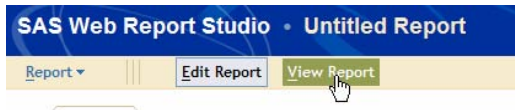
To insert text, drag and drop the text icon onto the layout grid.



Alignment tools exist on the bottom left hand corner of the report section. Select the object that needs to be center, left, or right aligned. Click on the appropriate button to align it.

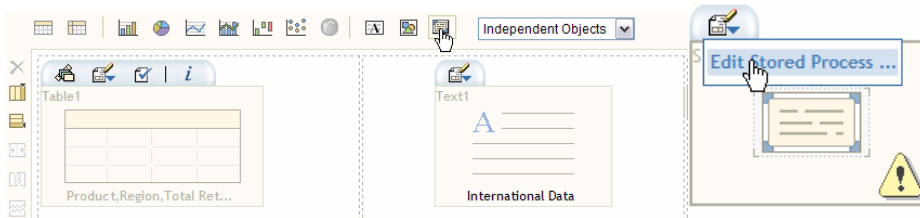


Scroll to the top of the screen. Click the 'View Report' button.



INSERTING STORED PROCESSES

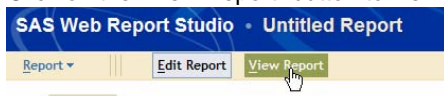
Stored processes can also be inserted into SAS® Web Report Studio reports. In the “Edit Report” window click on the “insert stored process” button in the report toolbar and drag it a location in the grid layout.



Select a stored process that SAS® Web Report Studio can access and click ok.



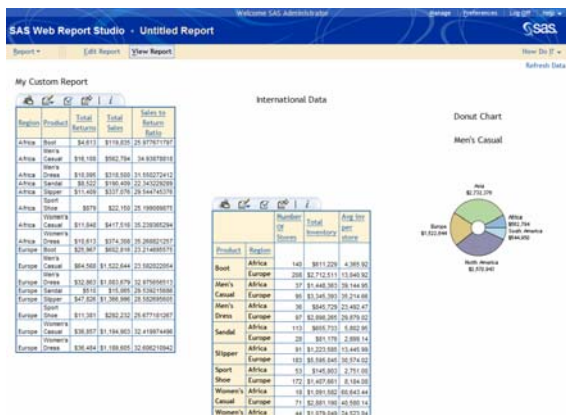
Click on the “View Report” button to view the updated report.



Since the stored process requires form input, the page prompts me to select a product for the stored process. Click the “View Report” button after selecting a stored process.



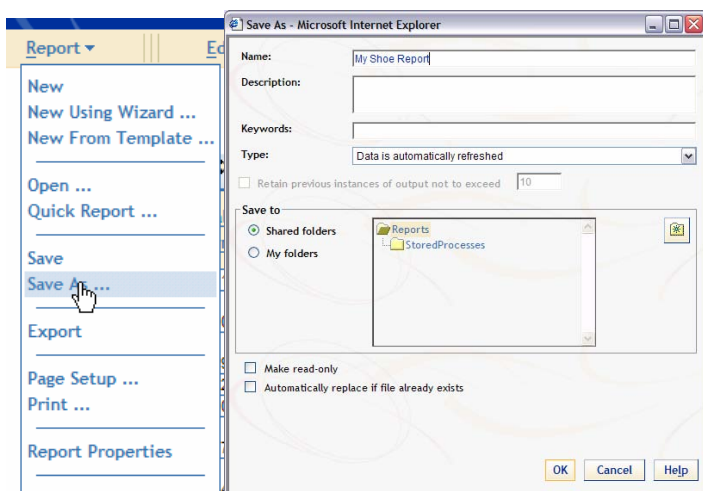
Below is the report with the output of the stored process in it.



SAVING REPORTS

Report can be either saved in a shared location or in a metadata directory that is only available to the report generator.

Report→Save As...



CONCLUSION

In conclusion, the combined usage of SAS® Information Map Studio and SAS® Web Report Studio enables data and business rules to be surfaced to end users in a flexible, ad-hoc reporting environment.

CONTACT INFORMATION

Your comments and questions are valued and encouraged. Contact the author at:

Brian Miles
 Zencos Consulting, LLC
 2530 Meridian Parkway
 Durham, NC 27713
 Work Phone: 919.806.4412
 Fax: 800.858.9315
 E-mail: brian.miles@zencos.com
 Web: www.zencos.com

Angela Hall
 Zencos Consulting, LLC
 2530 Meridian Parkway
 Durham, NC 27713
 Work Phone: 919.806.4412
 Fax: 800.858.9315
 E-mail: angela.hall@zencos.com
 Web: www.zencos.com

SAS and all other SAS Institute Inc. product or service names are registered trademarks or trademarks of SAS Institute Inc. in the USA and other countries. © indicates USA registration.
Other brand and product names are trademarks of their respective companies.